Algebra II – **Unit 10 Review** Name Answer Key

"We like good quotes." ELKS

1. Identify the following as arithmetic, geometric, or neither. Also find the next 2 terms.

a) $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}$ Circle one: Arithmetic Geometric (Neither)

$\frac{2}{3} \div \frac{1}{2}$ $\frac{2}{3} \cdot \frac{2}{1}$ $\frac{4}{3}$

b) 3, -6, 9, -12, 15, -18 Circle one: Arithmetic ~~Geometric~~ (Neither)

$\frac{-6}{3} = -2$ $\frac{9}{-6} = -\frac{3}{2}$ $-2 \neq -\frac{3}{2}$

c) 729, 243, 81, 27, 9, 3 Circle one: Arithmetic (Geometric) Neither

$\frac{243}{729} = \frac{1}{3}$ $\frac{81}{243} = \frac{1}{3}$ ✓

2. Write the formula for the following sequence.

-2, 4, 10, 16, ...

$t_1 = -2$

$d = 6$

$t_n = -2 + (n-1)6$ or $t_n = 6n - 8$

3. Find the specified term of the arithmetic sequence.

20, 17, 14, ... ; t_{20}

$t_1 = 20$

$d = -3$

$n = 20$

$t_{20} = 20 + (20-1)(-3)$

$= 20 + 19(-3)$

$\boxed{t_{20} = -37}$

4. Find the position, n, of the underlined term.

-5, .5, 6, 11.5, ..., 127

$t_1 = -5$

$d = 5.5$

$t_n = 127$

$127 = -5 + (n-1)5.5$

$+5 \quad +5$

$\frac{132}{5.5} = \frac{(n-1)5.5}{5.5}$

$24 = n - 1$

$+1 \quad +1$

$25 = n$

127 is the 25th term

5. Insert three arithmetic means between 12 and 2.

$t_1 = 12$

$n = 5$

$t_n = 2$

$2 = 12 + (5-1)d$

$-12 \quad -12$

$\frac{-10}{4} = \frac{4d}{4}$

$-\frac{5}{2} = d$ or $-2.5 = d$

$12, \underline{9.5}, \underline{7}, \underline{4.5}, 2$

$t_1 \qquad\qquad t_5$

6. Write the formula for the following sequence.

-6, -12, -24, ...

×2 ×2

$t_1 = -6$

$r = 2$

$t_n = -6(2)^{n-1}$

7. Find the specified term of the geometric sequence.

$\frac{1}{9}, \frac{-1}{3}, 1, -3, \ldots; t_{15}$

$n = 15$

$t_1 = \frac{1}{9}$

$r = -3$

$t_{15} = \frac{1}{9}(-3)^{15-1}$

$= \frac{1}{9}(-3)^{14}$

$t_{15} = 531{,}441$

8. Find the position, n, of the underlined term.

4, 16, 64, 256, ..., 16777216

$t_1 = 4$

$r = 4$

$t_n = 16777216$

$\frac{16777216}{4} = \frac{4(4)^{n-1}}{4}$

$4194304 = 4^{n-1}$

$\log_4 4194304 = n-1$

$\frac{\log 4194304}{\log 4} = n-1$

$11 = n-1$

$+1 \qquad +1$

$12 = n$

12th term

9. Insert three geometric means between 81 and 1.

$t_1 = 81$

$n = 5$

$t_n = 1$

$r = ?$

$81, \_\_, \_\_, \_\_, 1$

$t_1 \qquad\qquad t_5$

$\frac{1}{81} = \frac{81(r)^{5-1}}{81}$

$\sqrt[4]{\frac{1}{81}} = \sqrt[4]{r^4}$

$\frac{1}{3} = r$

$81, \underline{27}, \underline{9}, \underline{3}, 1$

10. Write the series in expanded form, and find its sum.

a) $\sum_{k=1}^{5} 4k-3 = \underset{k=1}{1} + \underset{k=2}{5} + \underset{k=3}{9} + \underset{k=4}{13} + \underset{k=5}{17} = \boxed{45}$

expanded form

b) $\sum_{k=1}^{5} 4(2)^{(k-1)} = \underset{k=1}{4} + \underset{k=2}{8} + \underset{k=3}{16} + \underset{k=4}{32} + \underset{k=5}{64} = \boxed{124}$

11. Rewrite the series into sigma notation.

a) $6 + 12 + 24 + \ldots + 98304$

t_{15}

$t_1 = 6 \quad n = ?$

$r = 2$

$t_n = 98304$

$\frac{98304}{6} = \frac{6(2)^{n-1}}{6}$

$16384 = 2^{n-1}$

$\log_2 16384 = n-1$

$\frac{\log 16384}{\log 2} = n-1$

$14 = n-1$

$+1 \quad +1$

$15 = n$

$t_n = 6(2)^{n-1}$

$\sum_{k=1}^{15} 6(2)^{k-1}$

b) $5 + 8 + 11 + 14 + \ldots$

$t_1 = 5$

$d = 3$

$t_n = 5 + (n-1)3$

$14 = n-1$

$\sum_{k=1}^{\infty} 5 + (k-1)3 = \boxed{\sum_{k=1}^{\infty} 3k + 2}$

$n = \infty$

12. A wealthy mother gives her daughter \$5 on her first birthday, \$10 on her second birthday, \$20 on her third birthday, and \$40 on her fourth birthday. If this pattern continues, what will be the gift on her 28th birthday?

Term #	1	2	3	4	...	28
B-day	1	2	3	4		28
\$	5	10	20	40	...	t_{28}

$t_1 = 5$

$r = 2$

$n = 28$

$t_{28} = 5(2)^{28-1}$

$= 5(2)^{27}$

$t_{28} = \$\ 67{,}108{,}640$